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EXAMINER

NATNAEL, PAULO S M

ART UNIT	PAPER NUMBER
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2614

DATE MAILED: 08/28/2003

6

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/695,873

Applicant(s)

ALBERTELLI, LAWRENCE E.

Examiner

Paulos M. Natnael

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 June 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims **6 and 7** are rejected under 35 U.S.C. 102(b) as being anticipated by Hibbs et al., U.S. Pat. No. 5,508,803.

Considering claim **6**, the claimed target for determining resolution of an imaging system by inspecting an image of said target for Moire, fringes in respective sub-fields of an image of said target, said target including a plurality of sub-fields, respective sub-fields including a plurality of features, said plurality of features of respective sub-fields of said plurality of sub-fields having a progression of image feature size and pitch, is met by Fig.1.

b) encompassing the spatial resolution of said imaging system, referred to an object plane of said imaging system, is met by the disclosure that the pitch is chosen in the monitor to be below the resolution of a lithographic exposure tool used therewith, (col. 3, line 66 thru col. 4, line 2) disclosing that the pitch and other parameters inherently encompass or reflect the resolution of the imaging system, the lithographic tool, etc.

Considering claim 7, a target as recited in claim 6, wherein said features include lines and spaces is met by the lines and spaces in Fig. 1;

3. Claims 6 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Sussmeier, U.S. Pat. No. 5,760,829.

Considering claim 6,

a) the claimed target for determining resolution of an imaging system by inspecting an image of said target for Moire, fringes in respective sub-fields of an image of said target, said target including a plurality of sub-fields, respective sub-fields including a plurality of features, said plurality of features of respective sub-fields of said plurality of sub-fields having a progression of image feature size and pitch, is met by Fig.2;

b) encompassing the spatial resolution of said imaging system, referred to an object plane of said imaging system, is met by the disclosure that test target is used to determine the dynamic range of the imaging device, (see col. 5, lines 37-39, and col. 6, lines 26-34) and contrast resolution of the imaging device.

Considering claim 7, a target as recited in claim 6, wherein said features include lines and spaces is met by the lines and spaces in Fig. 2;

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harshbarger, Jr. et al., U.S. Pat. No. 5,351,201.

Considering claim 1, Harshbarger, Jr. et al. disclose ~~all-claimed-subject-matter, note;~~

a) the claimed imaging a target including a plurality of subfields, respective sub-fields of said plurality of subfields providing a progression of image feature size and pitch encompassing the spatial resolution of said imaging system, to produce a captured image, is met by Fig. 4H, which is an imaging target for the camera 26 (fig.1).

b) inspecting said captured image for presence or absence of Moire, patterns in sub-fields of said captured image, is met by the disclosure "the first step 54, is to set up the camera-to-display under test interface, accomplished by adjustably mounting camera 26 in relation to display under test. This can be accomplished either manually or by an automated computer controlled procedure." (col. 8, lines 14-19) [emphasis added]

Except for;

c) determining resolution of said imaging system from feature size and pitch in respective sub-fields inspected in said inspecting step.

Regarding c),

Harshbarger et al., does not specifically disclose determining resolution of the imaging system from feature size and pitch by inspecting the subfields.

However, the Examiner takes Official Notice in that it is well known in the art for an operator to inspect an image for state of image degradation, or the presence of noise or other undesired patterns in the image displayed on a screen or monitor and to take measures to correct such degradation, which inspection would give the operator information about the performance of the camera or imaging system, resolution being one of the parameters of measurement of performance.

Therefore, it would have been obvious to the skilled in the art at the time the invention was made to implement the system of Harshbarger accordingly in order to facilitate the ability of determining the resolution of the imaging system or camera so that the performance of the system would be measured efficiently.

Considering claim **2**, determining step determines resolution from a subfield pattern having a minimum of Moire fringes.

Regarding claim 2, see rejection of claim 1(c).

Considering claim **3**, a method as recited in claim 1 wherein said determining step determines resolution from a subfield imaged as uniform gray subfield.

Regarding claim 3, see rejection of claim 1(c).

Considering claim 4, a method as recited in claim 1, including the further step of determining alignment of said imaging system from Moire' fringe angle in sub-fields inspected in said inspecting step, is met by camera alignment and focus, Fig.3, which can be performed manually. (col. 8, lines 14-19)

Considering claim 5, a method as recited in claim 1 including the further step of printing said target on a printer connected to a computer is met by step 66, report results of comparison. (see also printer 50, fig.2)

Considering claim 6, the claimed a target for determining resolution of an imaging system by inspecting an image of said target for Moire' fringes, said target including a plurality of sub-fields, respective subfield including a plurality of features, said plurality of subfields having a progression of image feature size and pitch encompassing the **spatial** resolution of said imaging system, referred to an object plane of said imaging system.

Regarding claim 6, see rejection of claim 1;

Considering claim 7, a target as recited in claim 6, wherein said features include lines and spaces is met by the lines and spaces in Fig. 4H, which show a progression of lines.

6. Claims **8-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sussmeier, U.S. Pat. No. 5,760,829 in view of Neyman, U.S. Pat. No. 5,917,987.

Considering claim **8**, Sussmeier discloses all claimed subject matter, except for; further including indicia indicating a resolution corresponding to feature size of features in a subfield;

Regarding claim **8**, Sussmeier does not specifically disclose indicia to indicate resolution. However, it is well known in the art to use numerical units on the screen or target image to indicate the value or range of a parameter.

In that regard, Neyman, for example, discloses a system for controlling the transfer of an image on a first medium to a second medium which uses a control chart as in Figs. 4-6 having fields labeled with luminance units 56a-56g corresponding to preferred range of luminance units. (see col. 10, lines 7-20)

Therefore, it would have been obvious to the skilled in the art at the time the invention was made to modify the system of Sussmeier by adding numerical units or indicia within the target image to numerically indicate its resolution corresponding to preferred range of resolution values in order to make the inspection easier for an operator who would then quickly compare and determine the resolution of a given target image by inspecting the numerical values therein.

Considering claim **9**, including indicia indicating a resolution corresponding to pitch of features in a subfield.

Regarding claims 9, see rejection of claim 8;

Considering claim **10** and **11**, wherein said indicia is a human readable number;

Regarding claims 10 and 11, see rejection of claim 8.

Considering claim **12**, including reference numbers corresponding to resolution of said imaging system and a further indicia.

Regarding claims 12, see rejection of claim 8.

Response to Arguments

7. Applicant's arguments filed June 16, 2003 have been fully considered but they are not persuasive. Response follows:

Applicant's Arguments

a) Specifically, as to **Harshbarger, Jr., et al.**, the Examiner call attention to Figure 4H as answering the terms of the claims while Figure 4H actually only shows three sets of lines of at very few lines each at different spacings seemingly unrelated to line width and, moreover, all of Figures 4A - 4J are screen patterns for evaluating parameters of the display and not sub-fields, much less sub-fields of a target where respective sub-fields have the properties recited which are specific to measurement of resolution by inspection; 4H being described as merely "a Video pattern screen" (column 9, lines 27 -

53) and evidently unsuitable for the production of Moire patterns by matching of pixel spacing due to the paucity of lines, coarseness of lines relative to full image size and seemingly arbitrary spacing between lines and, especially, the wide variation between line widths and pitches, while Figure 4F (possibly resembling a single sub-field of the invention but not the entirety of the target, as claimed) is disclosed as "a resolution target, evidently to determine whether the linear features can be resolved or not but not providing a teaching or suggestion of a target or technique by which a measurement of resolution can be performed by inspection, as provided by the present invention.

b) Therefore, even if it is considered that the respective regions correspond to claimed sub-fields, the sub-fields have only a single feature each, a constant pitch across all sub-fields, and the range of sizes and pitches does not encompass the resolution of the camera. Therefore, Hibbs et al. is very different from the present invention and it is unclear from the Examiner's statement of the rejection based on Hibbs et al. how the Hibbs et al. reference could be construed in a manner to even arguably teach or suggest the subject matter which the Examiner attributes to it and comprising the great majority of the salient features of the invention explicitly recited in the claims.

c) Similarly, in regard to Sussmeier the Examiner relies on Figure 2 which is a mask for determining dynamic range and has regions of equal area of featureless black, white and intervening levels of gray while Figures 3 and 4 are test patterns for determining horizontal and vertical contrast (as differentiated from spatial) resolution but which have

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neither subfields nor differing feature sizes or pitches much less encompassing the spatial resolution of the imaging device by inspection through formation of Moire patterns if the pitch of the image feature at the focal plane is unequal to pixel pitch. Therefore, like Hibbs et al., Sussmeier does not contain the teachings or suggestions which the Examiner attributes to it (in a statement of the rejection substantially identical, but for the Figure reference, to the rejection based on Hibbs et al.) and does not answer the majority of the explicit recitations of the claims or provide evidence of a level of ordinary skill in the art which would support a conclusion of obviousness of the subject matter of any claim in the application.

d) It is equally evident that Neyman does not supplement Sussmeier or any other of the applied references in regard to the deficiencies thereof discussed above except as teaching a target with a plurality of sub-fields to which indicia are applied (the sole feature for which it is apparently applied by the Examiner). The sub-fields (and "blended strips of recognizable colors") are featureless (and thus cannot form Moire patterns) and directed to gray scale, exposure latitude and color. Neyman thus does not teach or suggest most of the recited salient features of the invention absent from other references and does not provide evidence of a level of ordinary skill in the art which would support a conclusion of obviousness since it, in combination with any other applied prior art in any combination, does not lead to an expectation of success in providing accurate measurement of spatial resolution by inspection.

Examiner's Response

a) In Figure 1, Harshbarger discloses an apparatus comprising a camera 26, monitor 22. The screen or monitor 22 is the target, where the test patterns are displayed. (see col. 8, lines 27-62) Fig.4H of Harshbarger shows a representation of sample test patterns which are subfield of the entire screen display, although Harshbarger doesn't use the term "subfield". Fig.4H shows a progression of size and pitch which in turn reflects the resolution of the imaging device (see claim 1 rejection above). Harshbarger, for example, discloses that "Step 64 is where the processing unit interprets the results by comparing the received results to known operating range parameters for the specific set up or display. Once the processing unit has determined the degradation state of the display under test, step 66 is the reporting of the results to the operator." (col.9, lines 54-62) Although, Harshbarger is testing the display, the target image is taken by the camera and displayed on the monitor. The resolution of the image reflects the performance of the imaging device, and the degradation of resolution results in loss of image clarity as Harshbarger teaches. Thus, the argument that Fig. 4H does not provide a target or technique by which a measurement of resolution can be performed by inspection, is not persuasive.

b) Hibbs discloses a mask structure (fig.1), having different feature or size (line-width) and pitch, not a single feature as Applicant alleges. Hibbs does not disclose these line are the same feature. In fact, it is clear from Fig.1 that the stripes have different features

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and different pitch to the right and left of the center field 16. Hibbs also discloses that the pitch is chosen in the monitor to be below the resolution of a lithographic exposure tool used therewith. (col. 3, line 66 thru col. 4, line 2) In other words, the resolution of the tool is directly linked to the result or the parameters of the target. Therefore, the argument is not persuasive, because the resolution of the camera or imaging system and the resolution of the target displayed cannot be separated, the latter depends on the performance of the former.

c) Sussmeier discloses a method and apparatus for evaluating an imaging device.

Specifically, Sussmeier discloses that test target is used to determine the dynamic range of the imaging device. (see col. 5, lines 37-39, and col. 6, lines 26-34)

Sussmeier teaches sub-fields as the gray and black areas of the target and measured.

Furthermore, Sussmeier teaches that the mechanical drawing of Fig.2 is intended to indicate the relative size and position of the regions and zones, and does not accurately depict the appearance of the intermediate gray levels. Similarly, the array of regions that make up the test target may be regular or irregular in their arrangement. However, Sussmeier clearly discloses that the test targets in figures 3 and 4 are used to measure the contrast resolution and distortion of the imaging device under test. Therefore, the argument that the figures have neither subfields nor differing feature sizes or pitches much less encompassing the spatial resolution of the imaging, is unpersuasive.

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d) Neyman discloses a system for controlling the transfer of an image on a first medium to a second medium which uses a control chart as in Figs. 4-6 having fields labeled with luminance units 56a-56g corresponding to preferred range of luminance units. (see col. 10, lines 7-20) As shown in the rejection of claims 8-12, it would have been obvious to those with ordinary skill in the art at the time the invention was made to modify the system of Sussmeier by adding numerical units (or indicia) within the target image to numerically indicate its resolution corresponding to preferred range of resolution values in order to make the inspection easier for an operator who would then quickly compare and determine the resolution of a given target image by inspecting the numerical values therein. Therefore, the argument that Neyman does not supplement Sussmeier or any other of the applied references in regard to the deficiencies thereof is not persuasive, as clearly shown above.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

9. Asaida et al., U.S. Pat. No. 4,761,685 discloses apparatus and method for solid state image sensor element registration adjustment.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paulos M. Natnael whose telephone number is (703) 305-0019. The examiner can normally be reached on 6:30am -3pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Miller can be reached on (703) 305-4795. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4750.

Paulos Natnael *Pmn*
August 17, 2003


MICHAEL H. LEE
PRIMARY EXAMINER